



10 / Appeal
Brief
3-3-04

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:

Ponnusamy Palanisamy

Serial No.: 09/904,246

Filed: July 12, 2001

For: Interconnecting Large
Area Display Panels

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Art Unit: 2674

Examiner: Regina Liang

Docket: ITL.0581US
P11590

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Technology Center 2600

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

Applicants respectfully appeal from the final rejection mailed November 12, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee Intel Corporation.

II. RELATED APPEALS AND INTERFERENCES

None.

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Date of Deposit: February 20, 2004

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III. STATUS OF THE CLAIMS

Claims 1-10 have been finally rejected and are the subject of this appeal.

IV. STATUS OF AMENDMENTS

All amendments are believed to have been entered.

V. SUMMARY OF THE INVENTION

Referring to Figure 1, a display 10, in one embodiment, may be an organic light emitting device (OLED) display. The display 10 includes a display panel 12. In one embodiment, the display panel 12 includes a transparent glass sheet 13 having attached thereto a tri-pixel 15. The tri-pixel 15, in an OLED embodiment, may include a sandwich of a column electrode followed by an OLED material followed by row electrode. The row electrode may be formed of a metal or other conductive material. The column electrode is conventionally formed of a transparent conductive material, such as indium tin oxide (ITO). Specification, at page 3, line 11 through line 23.

Light is generated by the OLED material in response to the development of a potential across the material by the row and column electrodes. As a result, the OLED material emits light which passes through the column electrode of the tri-pixel 15 and the glass sheet 13 to be emitted by the display 10. Specification, at page 3, line 24 through page 4, line 3.

Control over the tri-pixels 15 may be provided through a circuit board 18 which receives signals from driver circuits 20. For example, the driver circuits 20 may indicate the color and intensity to drive the various tri-pixels 15. This information may be distributed by the circuit board 18 to the appropriate tri-pixels 15. Thus, the circuit board 18 may provide a signal distribution function to distribute signals processed by the driver circuits 20 to the individual tri-pixels 15. In one embodiment, the circuit board 18 may be a ceramic circuit board such as an

alumina circuit board including appropriate vias and interconnections. Specification, at page 4, line 4 through line 15.

The connections between the display panel 12 and the circuit board 18 may be implemented using interconnects 14 in the form of solder balls or other surface mount interconnection technologies. The interconnects 14 may be affixed to the circuit board 18 and/or display panel 12 using heat. Then the display panel 12 and circuit board 18 are brought together to physically and electrically interconnect the circuit board 18 to the display panel 12 by reflowing the solder to form the interconnects 14. At the same time, solder balls between the driver circuits 20 and the circuit board 18 may be reflowed, in one embodiment. Specification, at page 4, line 16 through page 5, line 2.

Referring to Figure 2, the display panel 12 may include a matrix of row electrodes 22a, 22b and 22c. As described previously, the row electrodes 22 may be made of a metal. The row electrodes 22 are deposited on top of the light emitting material, which is not shown in Figure 2. Beneath the light emitting material is an array of column electrodes 24a and 24b. Each column electrode 24 actually includes three separate lines, one line for each color of the tri-pixel indicated as P. Thus a line 25 is provided for each of the three colors of the pixel P. Thus the pixel P is defined by the region where row electrodes 22 and triset of column electrodes 24 overlap. Specification, at page 5, line 3 through line 14.

In one embodiment, an entire row of pixels is addressed or activated at one time. Thus, potential is applied to a given row electrode 22. Every pixel along the row then has its row activated. Each column electrode 24 is then selectively activated to activate a particular pixel at a particular intensity, if desired. Thus, in one pixel, the red subpixel may be activated whereas in the next pixel, the green subpixel may not be illuminated. The intensity of illumination of each pixel may be adjusted through appropriate column signals. Specification, at page 5, line 15 through line 24.

The column signals originating, for example, in the driver circuits 20 may pass through the circuit board 18. From the circuit board 18, those signals may pass through interconnects 14

to interconnect contact pads 28 on the display panel 12. From the contact pads 28, signals may pass, for example, through metallizations 34 to column line contacts 32. The column line contact 32 contacts a particular line 25 of a set of three column lines 24. Generally, as shown in Figure 2, the column connections are made by metallizations 34 which extend between adjacent rows 22 and run generally parallel thereto. Thus, the metallizations 34 run transversely to the direction of the column electrodes 24 in the space provided between adjacent rows 22. Specification, at page 5, line 25 through page 6, line 12.

The same space may be utilized to provide the pads 28 from the interconnects 14 for the row electrodes 22. The metallizations 30 for the row electrodes 22 run generally transversely to the row electrodes 22 and parallel to the length of the column electrodes 24. Each row interconnect system includes a pad 28 which makes contact to a solder ball or other interconnect 14 and a metallization 30 which runs from the pad 28 to a row contact 26. The row contact 26 contacts a particular row electrode 24 and provides an electrical connection thereto. Specification, at page 6, line 13 through line 22.

Thus, a system of pads 28, metallizations 30 and 34, and contacts 26 and 32 may all be deposited directly on to the display panel 12 in accordance with one example of a fabrication process. This may facilitate the fabrication of the display panel 12. Further, spaces are provided between basic column electrodes 24 that may be utilized for making connections to row electrodes 22 and likewise spaces may be provided between adjacent row electrodes 22 that may be utilized for making column electrode 24 connections. Specification, at page 6, line 23 through page 7, line 5.

Turning next to Figure 3, a portion of the display panel 12 is illustrated. The display panel 12 includes a horizontal edge 100 and a vertical edge 102. Ideally, connections are spaced well away from the edges 100 and 102 because of the possibility of disruption. In particular, when one display 10 is abutted to an adjacent display 10, sealing material may be utilized along that interface. This may interfere with the contacting process. Thus, it may be desirable to keep

a field along the edges 100, 102 as free as possible from interconnections. Specification, at page 7, line 6 through line 15.

In this regard, the edge proximate column metallizations 34 extend away from the edge 102. Similarly, the edge proximate row metallization 30 extend away from the edge 100. In the display portion shown in Figure 3, one row contact 26 is provided to each row electrode 22. Specification, at page 7, line 16 through line 21.

However, redundancy may be desirable and additional row connections may be provided to the same row electrode in a portion of the display 10 that repeats the pattern shown in Figure 3. Similarly, redundant column connections are provided along the length of the column electrodes 24. Thus, when any row electrode 22 is activated, the potential applied to a column electrode 24 may be repeated a large number of times along the exact same column electrode 24 to provide redundancy and fail safe operation as well as to distribute the potential equally along the lines 25. Specification, at page 7, line 22 through page 8, line 5.

Because ITO, which may be utilized for the column electrodes 24, is not as good a conductor as aluminum or silver, there may be resistive voltage drops along the column electrodes 24. To reduce the magnitude of these resistive voltage drops, it is desirable to provide multiple connections along the length of the column electrodes 24 at spaced locations along the column electrodes. Specification, at page 8, line 6 through line 13.

Referring to Figure 4, the layout of the row and column interconnections in the display portion of Figure 3 may be better understood. A series of column connections 40a and 40c are provided from the vertically oriented space E between adjacent column electrodes 24 to three column lines 25. Each column connection 40 includes three sets of pads 18, metallizations 34 and contacts 32. Specification, at page 8, line 14 through line 20.

In one embodiment, the column connections 40 are provided to every other set of vertically displaced pixels such as the pixels indicated at A and C. In addition, the column connection 40b is interposed in the otherwise vacant pixel space B. In one embodiment, a series

of horizontal spaces A, B, C, and D may be provided in a repeated fashion along the display panel 12. Every other space, such as the space B and D, may be left vacant. Specification, at page 8, line 21 through page 9, line 2.

The region F between adjacent sets of column electrodes 24, may be devoted to a vertical strip of row connects 50. Specification, at page 9, line 3 through line 5.

A field for the column connection 40g may be provided along the pixel region C. The column connections 40 may skip the field B, and may be repeated again as indicated at 40h in the field A. Specification, at page 9, line 6 through line 9.

Thus, redundant contacts may be provided while at the same time avoiding, to the greatest possible extent, placing contacts in the areas along peripheral edges. In some cases, available space between adjacent banks of contacts may be utilized near the edges to contain contacts that would otherwise be provided along the edge fields. Redundant column and row contacts are desirable. In many cases, multiple redundant contacts across the surface of the display panel 12 may be advantageous. Specification, at page 9, line 10 through line 18.

In addition, it may be desirable to maximize the area of the contacts to the greatest possible extent to minimize the total contact resistance. Specification, at page 9, line 19 through line 21.

Thus, with embodiments of the present invention, interconnections may be made within the pixel areas between the active areas and driver circuits across the face of the display panel 12. Thus, it is not necessary to undertake the relatively hazardous design of positioning the contacts around the periphery of the actual display producing elements. Specification, at page 9, line 22 through page 10, line 2.

VI. ISSUES

A. Is Claim 1 Obvious Over Oka In View Of Wachtler?

VII. GROUPING OF THE CLAIMS

All of the claims may be grouped with claim 1.

VIII. ARGUMENT

A. Is Claim 1 Obvious Over Oka In View Of Wachtler?

Claim 1 calls for a conductor coupling first and second contacts and extending generally along a plane. The plane is defined as that plane of face-to-face abutment between a display panel and a circuit board. The cited reference to Oka admittedly teaches no such conductor. The conductor is allegedly taught in Wachtler.

However, Wachtler is the conventional approach of simply lining up contacts on one device and the other device and directly bridging them. The claim calls for an offset conductor which allows elements that are not aligned with one another to be connected. Namely, the conductor couples the first and second contacts and extends generally along the plane. The solder balls 22 do not extend along the plane, which would be parallel to the elements 18 and 24, in Figure 7 of Wachtler.

Instead, the Wachtler solder balls extend between contacts on the PC board 24 to contacts on the overlay 18. In contrast, in Figure 2 of the present application, the conductors 32 extend along the plane of interface, allowing connections to be offset.

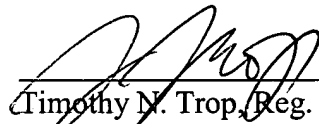
Therefore the rejection should be reversed.

IX. CONCLUSION

Applicant respectfully requests that each of the final rejections be reversed and that the claims subject to this Appeal be allowed to issue.

Respectfully submitted,

Date: February 20, 2004



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APPENDIX OF CLAIMS

1. A display comprising:
 - a circuit board;
 - a display panel electrically coupled to said circuit board in face-to-face abutment substantially along a plane; and
 - an electrical connection including a first contact on said circuit board, a second contact on said display panel, and a conductor coupling said first and second contacts and extending generally along said plane.
2. The display of claim 1 wherein said electrical connection is a surface mount connection including solder balls.
3. The display of claim 2 wherein said solder balls couple to the contact pads on one of said display panels or circuit boards.
4. The display of claim 3, said display panel including column electrodes and said conductor including a metallization coupled to said second contact on said display panel and extending to a third contact which contacts a column electrode.
5. The display of claim 4 wherein said column electrode is formed at least in part of indium tin oxide.
6. The display of claim 5 including a plurality of redundant third contacts to said column electrode.
7. The display of claim 6 including a plurality of second contacts aligned in a column parallel to said column electrode.

8. The display of claim 7, said display including pixels, wherein an electrical connection is made from said second contacts to said column electrode for every other pixel along the length of said column electrode.

9. The display of claim 8, said display including an edge, and including a zone, adjacent to said edge, free of electrical connections.

10. The display of claim 1 including a row electrode and a plurality of electrical connections from said second contacts to the row electrode, said second contacts that couple to said row electrode being arranged parallel to said column electrode.